Enabler Test Specification for Lightweight M2M

Candidate Version 1.0 – 03 Feb 2015

Open Mobile Alliance

OMA-ETS-LightweightM2M-V1_0-20150203-C

Contents

1. Scope

This document describes in detail available test cases for LightweigthM2M as specified in OMA-TS-LightweightM2M-V1_0.

The test cases are split in two categories, conformance and interoperability test cases.

The conformance test cases are aimed to verify the adherence to normative requirements described in the technical specifications.

The interoperability test cases are aimed to verify that implementations of the specifications work satisfactory.

If either conformance or interoperability tests do not exists at the creation of the test specification this part should be marked not available.

2. References

2.1 Normative References

[3GPP-TS_23.003] 3GPP TS 23.003 “Numbering, addressing and identification”

[CoAP] Shelby, Z., Hartke, K., Bormann, C., and B. Frank, "Constrained Application Protocol (CoAP)", draft-ietf-core-coap-18, Jun 2013.

[ETSI TS 102.221] “Smart Cards; UICC-Terminal interface; Physical and logical characteristics”, (ETSI TS 102 221 release 11),
URL:http://www.etsi.org/

[GlobalPlatform SCP 02] GlobalPlatform v2.2.1 - January 2011 - Appendix E : Secure Channel Protocol 02 (SCP 02)

[IOPPROC] “OMA Interoperability Policy and Process”, Version 1.1, Open Mobile Alliance™, OMA-IOP-Process-V1_1, URL:http://www.openmobilealliance.org/

[LWM2M-AD] “Lightweight Machine to Machine Architecture”, Open Mobile Alliance™, OMA-AD-LightweightM2M-V1_0, URL:http://www.openmobilealliance.org/

[LWM2M-TS] “Lightweight Machine to Machine Technical Specification”, Open Mobile Alliance™, OMA-TS-LightweightM2M-V1_0, URL:http://www.openmobilealliance.org/

[OBSERVE] Hartke, K. “Observing Resources in CoAP”, draft-ietf-core-observe-11 (work in progress), Oct 2013.

[PKCS#15] PKCS #15 v1.1: Cryptographic Token Information Syntax Standard”, RSA Laboratories, June 6, 2000.
URL: ftp://ftp.rsasecurity.com/pub/pkcs/pkcs-15/pkcs-15v1_1.pdf

[RFC2119] “Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, March 1997,
URL:http://www.ietf.org/rfc/rfc2119.txt

[RFC2234] “Augmented BNF for Syntax Specifications: ABNF”. D. Crocker, Ed., P. Overell. November 1997,
URL:http://www.ietf.org/rfc/rfc2234.txt

[RFC4122] “A Universally Unique Identifier (UUID) URN Namespace”, P. Leach, et al. July 2005,
URL:http://www.ietf.org/rfc/rfc4122.txt

[RFC5246] The Transport Layer Security (TLS) Protocol Version 1.2

[RFC5289] TLS Elliptic Curve Cipher Suites with SHA-256/384 and AES Galois Counter Mode (GCM)

[RFC5487] Pre-Shared Key Cipher Suites for TLS with SHA-256/384 and AES Galois Counter Mode

[RFC6347] Rescorla, E. and N. Modadugu, "Datagram Transport Layer Security Version 1.2", RFC 6347, January 2012.

[RFC6655] McGrew, D. and D. Bailey, "AES-CCM Cipher Suites for TLS", RFC6655, July 2012.

[RFC6690] Shelby, Z. “Constrained RESTful Environments (CoRE) Link Format”, RFC6690, Aug 2012.

2.2 Informative References

[DMREPPRO] “OMA Device Management Representation Protocol, Version 1.3”.
Open Mobile Alliance™. OMA-TS-DM_RepPro-V1_3.
URL:http://www.openmobilealliance.org

[OMADICT] “Dictionary for OMA Specifications”, Version 2.9, Open Mobile Alliance™,
OMA-ORG-Dictionary-V2_9, URL:http://www.openmobilealliance.org/

3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope”, are normative, unless they are explicitly indicated to be informative.

The following numbering scheme is used:

xxx-y.z-con-number where:

xxx	Name of enabler, e.g. MMS or Browsing
y.z	Version of enabler release, e.g. 1.2 or 1.2.1
’con’	Indicating this test is a conformance test case
number	Leap number for the test case

Or

xxx-y.z-int-number where:

xxx	Name of enabler, e.g. MMS or Browsing
y.z	Version of enabler release, e.g. 1.2 or 1.2.1
’int’	Indicating this test is a interoperability test case
number	Leap number for the test case

3.2 Definitions

Application	1) The customer's realisation of a service through M2M - e.g. satnav, smart metering
	2) Individual software components that run on top of the device's operating system.Access Point Name
Device	The hardware that is realising a function for the customer e.g. a smart meter.
Module	A modular component of a device e.g. the radio module housing the SIM

3.3 Abbreviations

API	Application Programming Interface
APN	Access Point Name
CoAP	Constrained Application Protocol
CON	Conformance
DM	Device Management
GDSP	Global Data Service Platform
GUI	Graphical User Interface
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IOP	Interoperability
LWM2M	Lightweight Machine to Machine (refers to this OMA enabler)
M2M	Machine to Machine
MSISDN	Mobile Station International Subscriber Directory Number
OMA	Open Mobile Alliance
OpCo	Operating Company
OS	Operating System
SIM	Subscriber Interface Module
UI	User Interface

4. Introduction

The purpose of this document is to provide test cases for LightweigthM2M Enabler Release V1.0.

The implementation of some features is optional for the Clients and/or the Servers in the LightweigthM2M Enabler. The tests associated with these optional features are marked as "(Includes Optional Features)" in the test specification.

The following items on an overall level are needed to adequately test the LWM2M enabler:

- A LWM2M server
- A LWM2M client e.g. embedded in a M2M device or module connected via UDP and SMS with the LWM2M server

The LWM2M enabler tests are carried out using the LWM2M protocol and objects, and using the underlying protocols such as [CoAP].

5. LightweightM2M Conformance Test Cases

None.

6. LightweigthM2M Interoperability Test Cases

6.1 Registration

6.1.1 LightweightM2M-1.0-int-101 – Initial Registration

Test Case Id	LightweigthM2M-1.0-int-101
Test Object	Client and Server
Test Case Description	Test that the Client registers with the Server.
Tool	n/a
Test code	n/a
Preconditions	o Device is turned on o The bootstrap procedure has been completed or the required bootstrap information is available to the client o The client has a LWM2M Server Object Instance.
Test Procedure	1. Device is switched on and bootstrap information is available to the device. 2. The device automatically registers at the server, once this information is available. Normal flow: a. Registration message (COAP POST) is sent from client to server. b. Client receives Success message (2.01 Created) from the server.
Pass-Criteria	1. Server has received REGISTER operation 2. Server knows the following • Endpoint Client Name • registration lifetime (optional) • LWM2M version (optional) • binding mode (optional) • SMS number (optional) • Objects and Object Instances (optional) 3. Client has received “Success” message from server

6.1.2 LightweightM2M-1.0-int-102 – Registration Update

Test Case Id	LightweigthM2M-1.0-int-102
Test Object	Client and Server
Test Case Description	Test that the client updates the registration information on the server.
Tool	n/a
Test code	n/a
Preconditions	o Need exists to re-register, e.g. previous registration has expired.

Test Procedure	1. Switch on device and try to Re-Register Normal flow: a. Re-Registration message (COAP PUT) is sent from client to server. b. Client receives Success message (2.04 Changed) from the server.
Pass-Criteria	1. Server has received REGISTER operation 2. Server knows the following • Endpoint Client Name • registration lifetime (optional) • LWM2M version (optional) • binding mode (optional) • SMS number (optional) • Objects and Object Instances (optional) 3. Client has received "Success" message from server

6.1.3 LightweightM2M-1.0-int-103 – Deregistration

Test Case Id	LightweigthM2M-1.0-int-103
Test Object	Client and Server
Test Case Description	Test that the client is able to deregister at the server.
Tool	n/a
Test code	n/a
Preconditions	o Client is registered
Test Procedure	1. Client will no longer be available, thus, it should de-register Normal flow: a. Deregistration message (COAP DELETE) is sent from client to server. b. Client receives Success message (2.02 Deleted) from the server.
Pass-Criteria	1. Client is removed from the servers registration database

6.1.4 LightweightM2M-1.0-int-104 – Registration Update Trigger

Test Case Id	LightweigthM2M-1.0-int-104
Test Object	Client and Server
Test Case Description	Test that the Client registers with the Server when triggered with the Registration Update Trigger (see LWM2M server object)
Tool	n/a
Test code	n/a
Preconditions	o Device is turned on o The bootstrap procedure has been completed or the required bootstrap information is available to the client o The client has a LWM2M Server Object Instance. o The device is regsitered with the server.

Test Procedure	1. Binding is set to U (as in TS section 5.2.1.1) 2. De-registration is performed, or, alternatively registration expires 3. Server sends Registration Update Trigger via SMS Normal flow: a. Binding is set by sending COAP PUT 1/7 with string content "U" from server to device b. Server receives Success message (2.04 Changed) from the device c. Device registration expires on the server (for test purposes a short registration lifetime could be chosen) d. Registration Update Trigger message COAP POST 1/8 is sent from server to client via SMS e. Re-Registration message (COAP PUT) is sent from client to server via UDP f. Client receives Success message (2.04 Changed) from the server.
Pass-Criteria	1. Server has received REGISTER operation via UDP 2. Server knows the following • Endpoint Client Name • registration lifetime (optional) • LWM2M version (optional) • binding mode (optional) • SMS number (optional) • Objects and Object Instances (optional) 3. Client has received "Success" message from server

6.2 Device object-related use cases

6.2.1 LightweightM2M-1.0-int-201 – Querying basic information from the client in Plain Text format

Test Case Id	LightweigthM2M-1.0-int-201
Test Object	Client and Server
Test Case Description	Querying the following data on the client: • Manufacturer • Model number • Serial number
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server

Test Procedure	1. A READ operation from server on these resources has been received by the client. Normal flow: a. READ (COAP GET) on device object resources, with the CoAP Accept option to indicate the requested content format: Plain Text b. Server receives success message (2.05 Content) and the requested values in the requested format.
Pass-Criteria	1. Server has received the requested information and display of the following data to the user is possible: • Manufacturer • Model number • Serial number

6.2.2 LightweightM2M-1.0-int-201 – Querying basic information from the client in TLV format

Test Case Id	LightweigthM2M-1.0-int-201
Test Object	Client and Server
Test Case Description	Querying the following data on the client: • Manufacturer • Model number • Serial number
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server
Test Procedure	1. A READ operation from server on these resources has been received by the client. Normal flow: a. READ (COAP GET) on device object resources, with the CoAP Accept option to indicate the requested content format: TLV i. Bits 7-6=00= Object Instance in which case the Value contains one or more Resource TLVs ii. Bits 7-6=11= Resource with Value b. Server receives success message (2.05 Content) and the requested values in the requested format.
Pass-Criteria	1. Server has received the requested information and display of the following data to the user is possible: • Manufacturer • Model number • Serial number

6.2.3 LightweightM2M-1.0-int-201 – Querying basic information from the client in JSON format

Test Case Id	LightweigthM2M-1.0-int-201
Test Object	Client and Server
Test Case Description	Querying the following data on the client: • Manufacturer • Model number • Serial number
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server
Test Procedure	1. A READ operation from server on these resources has been received by the client. Normal flow: a. READ (COAP GET) on device object resources, with the CoAP Accept option to indicate the requested content format: JSON b. Server receives success message (2.05 Content) and the requested values in the corresponding format.
Pass-Criteria	1. Server has received the requested information and display of the following data to the user is possible: • Manufacturer • Model number • Serial number

6.2.4 LightweightM2M-1.0-int-202 – Querying the firmware version from the client

Test Case Id	LightweigthM2M-1.0-int-202
Test Object	Client and Server
Test Case Description	Querying the firmware version of the firmware on the managed device
Tool	n/a
Test code	n/a
Preconditions	o Device is registered with the Server
Test Procedure	1. A READ operation from server on the resource has been received by the client. Normal flow: a. READ (COAP GET) on device object resource “firmware version”, with the CoAP Accept option value “0” to indicate the “text/plain” content format; b. Server receives success message (2.05 Content) and the requested value in the corresponding Plain Text format.
Pass-Criteria	1. Server has received the requested information and displays to the user the following information: • Firmware version

6.2.5 LightweightM2M-1.0-int-203 – Rebooting the device

Test Case Id	LightweigthM2M-1.0-int-203
Test Object	Client and Server
Test Case Description	Test that rebooting of the device remotely through the server is possible.
Tool	n/a
Test code	n/a
Preconditions	o Device is switched on and registered with the server. (Device might be in a state that requires a reboot)
Test Procedure	1. An EXECUTE operation from server on the resource object/reboot has been received by the client. Normal flow: a. Server performs Execute (COAP POST) on device/reboot resource b. Server receives success message (2.04 Changed) from client
Pass-Criteria	1. Device reboots successfully and re-registers at the server again

6.2.6 LightweightM2M-1.0-int-204 – Querying power status of the terminal

Test Case Id	LightweigthM2M-1.0-int-204
Test Object	Client and Server
Test Case Description	Test that you can query the device for its power status (e.g. on battery or on mains) and/or for the voltage level of its power supply.
Tool	Device Hardware
Test code	n/a
Preconditions	o Device is registered with the LWM2M server. o Device is operational and connected to some power supply
Test Procedure	1. A READ operation from server on these resources is received by the client. Normal flow: a. READ (COAP GET) on the following device object resources related to power status, with the CoAP Accept option to indicate the requested content format: o Available Power Sources o Battery level o Power Source Voltage o Power Source Current b. Server receives success message (2.05 Content) and the requested values in the corresponding TLV or JSON format
Pass-Criteria	1. Available Power Source status and Battery level are available on the server and can be displayed. 2. Voltage and current level of the power supply to the device is available on the server and can be displayed.

6.3 Device firmware update

6.3.1 LightweightM2M-1.0-int-301 – Firmware update (via COAP)

Test Case Id	LightweigthM2M-1.0-int-301
Test Object	Client and Server
Test Case Description	Perform a device firmware update remotely triggered by the LWM2M server.
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server o Device is switched on and operational. o Firmware Update is available on the Server
Test Procedure	1. A WRITE operation from the server on firmware/package is received by the client Normal flow: a. The server delivers the firmware to the device through a WRITE (COAP PUT/POST) operation on firmware/package b. A READ (COAP GET) on firmware/state provides the status of the firmware download to the client c. The server may send repeated READs (COAP GETs) to determine when the download is completed. d. If the download is completed, the server initiates a firmware update by EXECUTE (COAP POST) firmware/update e. The device is rebooting. f. The server READs the result of the firmware update procedure.
Pass-Criteria	1. New firmware is installed on the device. 2. The device is rebooted. 3. The server receives the status code “2.00” for success.

6.3.2 LightweightM2M-1.0-int-302 – Firmware update (via alternative mechanism)

Test Case Id	LightweigthM2M-1.0-int-302
Test Object	Client and Server
Test Case Description	Perform a device firmware update remotely triggered by the LWM2M server.
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server o Device is switched on and operational. o Firmware Update is available on the Server

Test Procedure	1. A WRITE operation from the server on firmware/package URI is received by the client Normal flow: a. The server delivers the firmware URI to the device through a WRITE (COAP PUT/POST) operation on firmware/URI b. The device downloads the firmware from the URI via an alternative mechanism (not COAP) c. A READ (COAP GET) on firmware/state provides the status of the firmware download to the client d. The server may send repeated READs (COAP GETs) to determine when the download is completed. e. If the downloaded is completed, the server initiates a firmware update by EXECUTE (COAP POST) firmware/update f. The device is rebooting. g. The server READs (COAP GET) the result of the firmware update procedure.
Pass-Criteria	1. New firmware is installed on the device. 2. The device reboots. 3. The server receives the status code "2.00" for success.

6.4 Connectivity object monitoring

6.4.1 LightweightM2M-1.0-int-401 – Querying of connectivity parameters

Test Case Id	LightweigthM2M-1.0-int-401
Test Object	Client and Server
Test Case Description	Querying multiple parameters related to connectivity on the device.
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server o Device is switched on and operational.
Test Procedure	1. A READ (COAP GET) operation from server on the following resources has been received by the client (using Plain Text, TLV, or JSON format): • Network bearer (used) • Available network bearer • Signal Strength • Link quality • Service mobile network code • Country code • Cell ID • APN • IP address of the device
Pass-Criteria	1. The server has received the requested information and display to the user is possible.

6.5 Observe and Notify

6.5.1 LightweightM2M-1.0-int-501 – Observation and notification of parameter values

Test Case Id	LightweigthM2M-1.0-int-501
Test Object	Client and Server
Test Case Description	Sending the observation policy to the device.
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server o Device is switched on and operational.
Test Procedure	1. The Server establishes an Observation relationship with the Client to acquire conditional notifications about: • Line Voltage • Signal Strength Normal flow: a. Server communicates to the device min/max period, threshold value and step with a WRITE ATTRIBUTE (COAP PUT) operation b. Server sends OBSERVE (COAP Observe Option) message to activate reporting c. Client reports requested information with a NOTIFY message (COAP responses)
Pass-Criteria	1. The server has received the requested information and display of “Line Voltage” and “Signal Strength” to the user is possible.

6.5.2 LightweightM2M-1.0-int-502 – Cancel observations using “Cancel Observation” operation

Test Case Id	LightweightM2M-1.0-int-502
Test Object	Client and Server
Test Case Description	Cancel the Observation relationship by sending “Cancel Observation” operation.
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server o Device is switched on and operational. o Server established Observation relationship with the Client.

Test Procedure	1. The Server removes a pre-established Observation relationship by sending "Cancel Observation". The Client removes conditional notifications about: • Line Voltage • Signal Strength Normal flow: a. Client reports requested information with a NOTIFY message (COAP responses) b. Server sends Cancel Observe (COAP RESET message) to cancel the Observation relationship. c. Client stops reporting requested information and removes associated entries from the list of observers.
Pass-Criteria	1. The server stops receiving information on "Line Voltage" and "Signal Strength" and associated entries from the list of observers are removed.

6.5.3 LightweightM2M-1.0-int-503 – Cancel observations using "Write Attributes" with Cancel parameter

Test Case Id	LightweightM2M-1.0-int-503
Test Object	Client and Server
Test Case Description	Cancel the Observation relationship by sending "Write Attributes" with Cancel parameter.
Tool	n/a
Test code	n/a
Preconditions	o Device is registered at the LWM2M server o Device is switched on and operational. o Server established Observation relationship with the Client.
Test Procedure	1. The Server removes a pre-established Observation relationship by sending "Cancel Observation". The Client removes conditional notifications about: • Line Voltage • Signal Strength Normal flow: a. Server communicates to the device Cancel parameter for "Line Voltage" and "Signal Strength" with a WRITE ATTRIBUTE (COAP PUT) operation. b. Client removes associated entries from the list of observers. No further NOTIFY messages are to the Server by the Client.
Pass-Criteria	1. The server stops receiving information on "Line Voltage" and "Signal Strength" and associated entries from the list of observers are removed.

6.6 Security

6.6.1 LightweightM2M-1.0-int-601 – UDP Channel Security – Pre-shared Key Mode

Test Case Id	LightweigthM2M-1.0-int-601
Test Object	Client and Server
Test Case Description	Establishing DTLS session using UDP pre-shared key mode
Tool	n/a
Test code	n/a
Preconditions	o The bootstrap procedure has been completed or the required bootstrap information is available to the client. o The bootstrap information includes the Security Mode resource of the object LWM2M Security set to 0: Pre-Shared Key mode o The client has a LWM2M Server Object Instance.
Test Procedure	1. Device is switched on and bootstrap information is available to the device. 2. The device automatically registers at the server, once this information is available and a DTLS session is established between client and server. 3. Using this DTLS session, GET commands are sent from the server to the client, and the client sends back the requested resource values. Normal flow: a. Registration message (COAP POST) is sent from client to server. b. Client receives Success message (2.01 Created) from the server. c. READ (COAP GET) on e.g. ACL object resources d. Server receives success message (2.05 Content) and the requested values (encrypted)
Pass-Criteria	• Registration and READ commands work successfully over DTLS session.

6.7 CONNMGMT Object

6.7.1 LightweightM2M-CONMGMT-1.0-int-701 – APN configuration

Test Case Id	LightweightM2M-CONMGMT-1.0-int-701
Test Object	Client and Server
Test Case Description	Creating and enabling a new APN profile
Tool	n/a
Test code	n/a

Preconditions	o Device is switched on and operational o Device is registered at the LWM2M server o Device has a Cellular Network Connectivity object and one instance of an APN Connection Profile object. Cellular connectivity is established with the parameters given in the APN Connection Profile object instance.
Test Procedure	Normal flow: a. CREATE (COAP POST) operation is performed by the server targeting 11/1 to create a 2nd instance of the APN connection profile object with a new APN which is not yet active. b. Server receives success message (2.01 Created) c. Client is triggered to do a REGISTER operation e.g. by power off/on d. REGISTER message (COAP POST) is sent from client to server including information about the supported Objects and Object Instances including the new instance of the APN Connection Profile object e. Client receives 2.01 Created indicating successful completion of register message. f. Server activates the new APN Connection Profile by changing Enable status to True by WRITE 11/1/3 (COAP PUT) g. Server receives success message (2.04 Changed) h. Server reads the list of active APN Connection Profiles by performing READ 10/4000 i. Server receives success message (2.05 Content) indicating the active APN Connection Profiles
Pass-Criteria	• New APN connection profile is active NOTE: In case the device only supports one active APN profile this test is passed when the new APN profile is activated.

6.7.2 LightweightM2M-CONMGMT-1.0-int-702 – Bearer Selection

Test Case Id	LightweightM2M-CONMGMT-1.0-int-702
Test Object	Client and Server
Test Case Description	Controlling bearers using Bearer Selection Object
Tool	n/a
Test code	n/a
Preconditions	o Device is switched on and operational o Device is registered at the LWM2M server o Device has a Cellular Network Connectivity object and one instance of an APN Connection Profile object. Cellular connectivity is established with the parameters given in the APN Connection Profile object instance. Also, Device has a WLAN Connectivity object but WLAN radio is not enabled.

Test Procedure	Normal flow: a. CREATE (COAP POST) operation is performed by the server targeting 13/0 to create the instance of the Bearer selection object with Preferred Communication Bearer (13/0/0) as WLAN preferred. b. Server receives success message (2.01 Created) c. Client shall turn on the WLAN radio and use it for connectivity with the Server. Client shall send Update to the Server indicating the update in registration as the Client's IP address (and port) has changed. d. Server checks the status of the WLAN connectivity object by performing a READ on /12/0. The interface shall be enabled and running. The Server shall verify the values of Enable and Status resources for the same. e. Server performs WRITE operation on Preferred Communication Bearer (13/0/0) resource and updates its value to 3GPP PS Preferred. f. Client shall turn on the Cellular network connectivity (if not already enabled) and use it for connectivity with the Server. Client shall send Update to the Server indicating the update in registration as the Client's IP address (and port) has changed. g. Server checks the status of the Cellular Network Connectivity object by performing a READ on /10. The interface shall be enabled and running.
Pass-Criteria	• Bearer Selection Object is allowing the Server to control Client interface for communication

6.8 Location Object

6.8.1 LightweightM2M-1.0-int-801– Location Object

Test Case Id	LightweightM2M-1.0-int-801
Test Object	Client and Server
Test Case Description	Querying and Observing parameters related to Location Object
Tool	n/a
Test code	n/a
Preconditions	o Device is switched on and operational o Device is registered at the LWM2M server

Test Procedure	1. A READ (COAP GET) operation from server on the following resources has been received by the client (using Plain Text, TLV, or JSON format): • Latitude • Longitude • Timestamp 2. The Server establishes an Observation relationship with the Client to acquire conditional notifications about: • Latitude • Longitude Normal flow: a. Server communicates to the device min/max period with a WRITE ATTRIBUTE (COAP PUT) operation b. Server sends OBSERVE (COAP Observe Option) message to activate reporting c. Client reports the latest Latitude and Longitude values with a NOTIFY message (COAP responses) as per the min/max period provisioned earlier.
Pass-Criteria	1. The server has received the requested information and display to the user is possible.

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-ETS-LightweightM2M-V1_0	18 Jun 2013	All	First Draft as agreed in OMA-IOP-MEC-2013-0083-INP_ETS_for_LWM2M
	17 Oct 2013	All	Cleaned up Version for the LWM2M Testfest in Las Vegas as agreed in OMA-IOP-MEC-2013-0103-CR_Clean_up_of_LWM2M_ETS
	20 Dec 2013	1, 2.1, 3.3, 5, 6.1.3, 6.2, 6.3, 6.4, 6.5	Incorporated CR: OMA-IOP-MEC-2013-0115-CR_LWM2M_ETS_Update Editorial changes
	19 Feb 2014	2.1, 6.1.4, 6.2.1, 6.2.2, 6.2.3, 6.4.1, 6.5, 6.6	Incorporated CR: OMA-IOP-MEC-2014-0005R01-CR_LWM2M_ETS_new_test_cases Editorial changes
Candidate Version OMA-ETS-LightweightM2M-V1_0	26 Feb 2014	n/a	Status changed to Candidate by TP TP Ref # OMA-TP-2014-0047-INP_LightweightM2M_V1_0_ETS_for_Candidate_approval
Draft Version OMA-ETS-LightweightM2M-V1_0	22 Jan 2015	6.7, 6.8	Incorporated CRs: OMA-IOP-MEC-2015-0001R01-CR_LWM2M_ETS_CONMGMT_test_case_for_APN_configuration OMA-IOP-MEC-2015-0002-CR_LWM2M_ETS_Location_Object_Test_Case OMA-IOP-MEC-2015-0003-CR_LWM2M_ETS_CONMGMT_test_case_for_Bearer_Selection Editorial changes
Candidate Version OMA-ETS-LightweightM2M-V1_0	03 Feb 2015	n/a	Status changed to Candidate by TP TP Ref # OMA-TP-2015-0042-INP_LightweightM2M_V1_0_ETS_for_Candidate_re_approval

Appendix B. Additional Information

B.1 Example of Test Configuration and Setup

The following hardware components were part of a test setup.

- M2M device equipped with LWM2M client
- Computer that runs the browser interface to the LWM2M server component
- Server that runs the LWM2M server software
- USIM provisioned for use on the network.
- External appliance which is connected directly to M2M device (e.g. light, temperature sensor, motor).

In addition the demonstration setup shall include the following software components:

- Measurement software which enables to see e.g. LWM2M messages and CoAP messages.
    - The software shall enable
        - GUI to trigger the chosen test cases
        - To see the flow of information between client and server, e.g. on LWM2M protocol level and on CoAP transport level.